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THE PLANT DISEASE REPORTER

Issued by

THE PLANT DISEASE SURVEY

DIVISION OF MYCOLOGY AND DISEASE SURVEY

Vol. XVII September 15, 1933 Number 11

LOG INTERCEPTIONS AT NORFOLK IN RELATION TO THE ENTRY OF TREE DISEASES

G. F. Gravatt and Marvin E. Fowler

The first shipment of elm logs to be detected upon their entry into this country was found at Norfolk, Virginia, by Plant Quarantine Inspectors M. C. Rich and L. A. Mayer. It consisted of four burl logs from France, arriving on July 25, 1933. The authors did not see this shipment. The first lot of logs brought to our attention was found by L. M. Scott, the quarantine inspector at Baltimore, Maryland, on August 7, 1933. Cultures made by Curtis May and the junior author from discolored streaks in the wood gave Graphium ulmi, the fungus which causes the Dutch elm disease. These findings were reported by R. Kent Beattie, who has charge of the Dutch elm disease work, in a paper given at the Ninth Annual Shade Tree Conference.

The next shipment which arrived from France at Norfolk, Virginia, on August 15, 1933, consisted of the four logs shown in Figures 5 and 6. These logs were examined by the senior author and cultures from discolored streaks in the wood and from the inner bark of these logs gave Graphium ulmi. Typical coremia have developed in these cultures. These logs contained the two species of Scolytus beetles, Scolytus scolytus and S. multistriatus, which have been proved by European investigators to be carriers of the fungus causing Dutch elm disease. The beetles were identified by Dr. M. W. Blackman of the Bureau of Entomology.

Cultures were also made from 7 adult beetles of Scolytus scolytus and 52 larvae taken from this last-mentioned shipment. The adult beetles were given a superficial wash in sterile water and planted in potato dextrose agar. A number of fungi and bacteria grew from each of these plantings and Graphium ulmi was isolated from one. The larvae were surface sterilized in 1/1000 Hg Cl_2 for one minute then washed through four changes of sterile water before being macerated in potato dextrose agar. Of the 52 larvae of different sizes, 14 gave Graphium ulmi.

The next shipment examined arrived in Norfolk on August 22, 1933. This shipment consisted of 7 logs, all of which were infested with Scolytus beetles, and cultures from discolored streaks in the wood gave Graphium ulmi

with coremia. Several of these logs still had green bark. Before reaching Norfolk practically all of the beetles had emerged from two of the logs.

Such introductions of elm logs for veneer purposes might well have been the means of entrance for this disease into the United States. One species of Scolytus beetles, S. multistriatus, has been present in this country around Boston for over 20 years and in other places for a shorter time, but no infections of the Dutch elm disease have been found in these insect-infested regions except in New Jersey and New York within a radius of 30 miles around New York City. The two small infections (1) of the Dutch elm disease in Ohio were in territory not known to be infested with this beetle.

Word was received from the plant-quarantine inspector at New Orleans, Louisiana, on September 6 that a shipment of 6 elm veneer logs infested with beetles had been received at his port. On the same day a reprint was received from Dr. Christine Buisman (2) of Holland, giving the results of her inoculation of some American species of elms which grow in the Southern States. The 7 species of American elms which she tested were found to be very susceptible to this disease. It is interesting to note that the cork elm, Ulmus alata, and the cedar elm, U. crassifolia, are extensively utilized as shade trees in the Southern States and would be endangered by any infected elm log shipments to southern ports such as Norfolk and New Orleans. We hear so much about the American elm that we tend to overlook the importance of some of the other species of elms, but, unfortunately, all of the American species tested seem to be susceptible to this disease.

The manager of one of the plants importing these veneer logs informed us that this elm veneer is just coming into style and he expects an increasing demand for it. This demand is developing at a time when the killing of many elms in Europe by the Dutch elm disease has resulted in attempts to increase utilization of elms just as the killing of our native chestnut growth in New England and the Middle Atlantic States by the Asiatic fungus, Endothia parasitica, has resulted in its increased utilization.

In addition to containing the Dutch elm disease fungus, the 4 imported elm logs received at Norfolk on August 15 showed soft decayed heartwood with at least two different types of decay. Figure 6, log No. TL 2, shows a very large decayed area occupying one-third of the basal area of the log. A moist developing sporophore, 1 inch in diameter, was found attached to the decayed wood on one of the logs. Identification is being attempted by culture methods. Even if this heartrotting fungus is a species that is already present in this country, it is possible that it may be a more virulent strain than the ones already here. Veneer logs sometimes stay in the yards for many months before they are sawed, giving abundant opportunity for the fruiting of any wood-rotting fungi introduced with them. We have little information on which to base an opinion on the destructiveness of a new heartrot fungus introduced into this country, but we do know that our native heartrotting fungi are already causing a loss of 15 to 20 per cent of the volume of our hardwood timber. It is desirable to cut down the risk of introducing new ones so far as practicable. It is recognized that demands of trade require shipment of boxes, lumber and other wood products

Figure 5. Four elm logs from France on the pier at Norfolk, Virginia. Logs were infested with two species of Scolytus beetles and with the Dutch elm disease. (Photograph by M. C. Rich through courtesy of Virginia Truck Experiment Station).

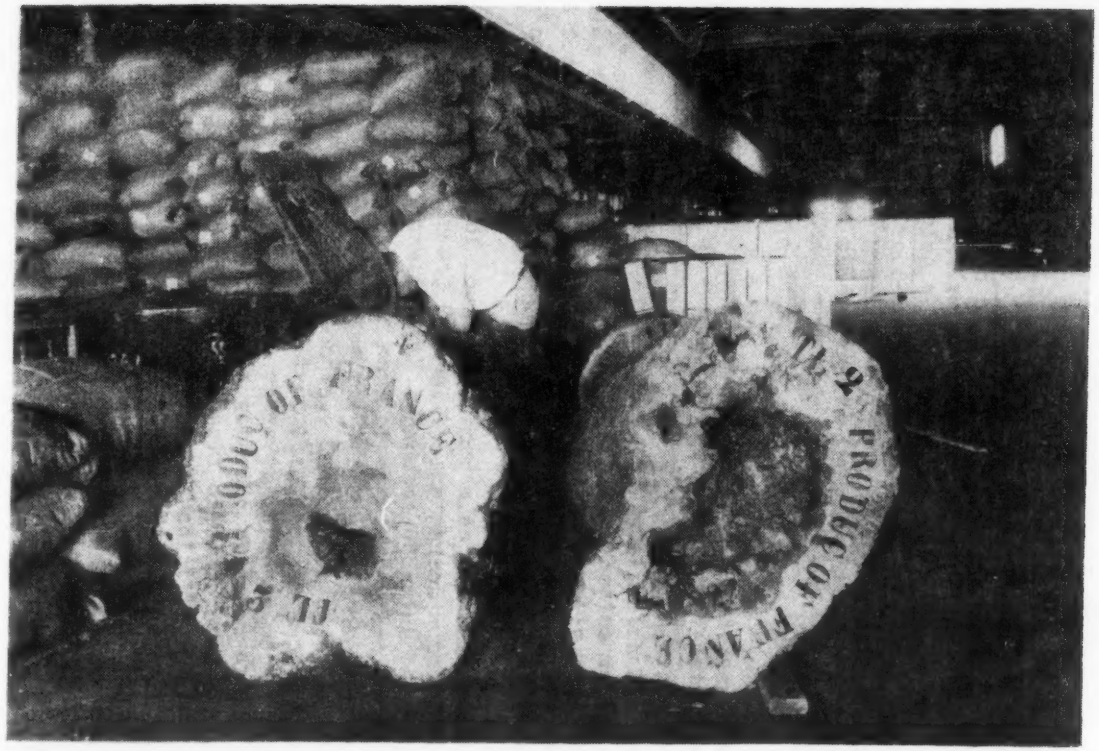

Figure 6. End view of two of the logs. Notice the large area of decayed wood in the larger log. (Photograph by M. C. Rich through courtesy of Virginia Truck Experiment Station).

which, in some cases, bring in new organisms, but the opportunities for heartrotting fungi to fruit on such material are very much poorer than on logs. According to import records (3) logs were imported to the United States from 40 different foreign countries in 1931.

Dr. James R. Weir (4) collected sporophores of two species of wood-destroying fungi (Polystictus persoonii Fr. and Trametes atypus Liv.) from old timbers stacked on the harbor wharves at Bellingham, Washington. These fungi are not native of this country, but are common in tropical and semi-tropical countries where they evidently cause a serious rot. He found also that two other wood-rotting fungi from Cuba when exposed to the winter weather of Missoula, Montana, -30° F., were not killed and continued to grow. This test and other results indicate that we may have something to fear even from the fungi arriving on timbers from the tropical and sub-tropical regions.

In a Norfolk veneer yard there were noted logs with the bark still on, from the tropics of Central America and from Australia, some of which logs showed insect tunnels. No extensive decayed areas were found. Most of our tree killing diseases are caused by bark inhabiting fungi. The majority of the bark fungi produce fruiting bodies very quickly when the material is placed in the proper conditions, while most of the heart-rotting fungi fruit much less rapidly. For these reasons imported logs, round edge boards and large timbers with bark attached are extremely dangerous.

An instance of round edge boards as possible carriers of disease was the finding at Brest, France, by the senior author, of remains of a small part of a chestnut blight canker on adhering bark on the outer rough edge of a packing case made of chestnut board which had arrived from America. Dr. Haven Metcalf (5) found a canker of chestnut blight on a chestnut staging-pole at London. In both these cases cultures failed to give any growth of the chestnut blight organism, but tests have shown that the blight fungus remains alive in bark and wood for many months. It is interesting, in connection with the chestnut blight and the Dutch elm disease, to note that on the basis of tests of various strains of European chestnuts in this country the prediction is made that the chestnut blight fungus would cause destruction there if it were to become established, and as a result of the numerous tests in Europe showing the great susceptibility of the different American elm species to the Dutch elm disease the prediction is made of heavy losses here if this outbreak in New York and New Jersey is not eradicated.

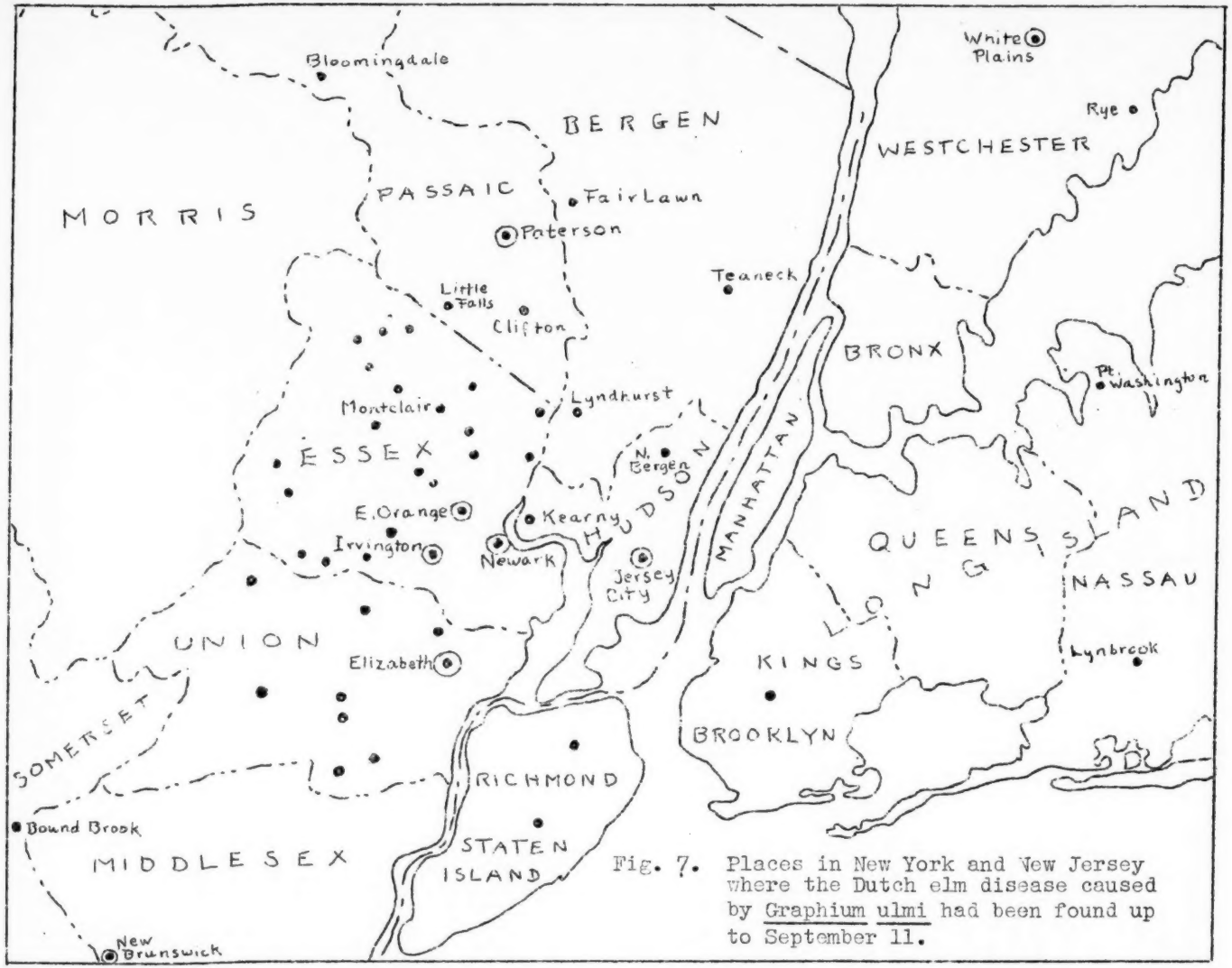

Fig. 7. Places in New York and New Jersey where the Dutch elm disease caused by Graphium ulmi had been found up to September 11.

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KNOWN DISTRIBUTION OF DUTCH ELM DISEASE IN THE UNITED STATES

With the allotment of National Industrial Recovery funds for the purpose, the work of determining the exact range of the Dutch Elm Disease in North America entered a new phase. In addition to the systematic scouting now being undertaken in the known infected region in New Jersey and New York, widespread cruising is underway in other nearby parts of New York and in Massachusetts, Connecticut, and Pennsylvania. This cruising is being done by groups of pathologists and tree surgeons under the leadership of those who have been active in the New Jersey work during the summer.

The range of the disease as determined up to September 11 is shown by the accompanying map, Figure 7.

The total number of trees found infected up to that date was 402 of which 388 were in New Jersey and 14 in New York. These were found in 9 different localities in New York and in 44 New Jersey towns and cities of which 23 are in Essex County.

Two distinctly encouraging features appear. First, the work of the past month has not greatly extended the known range of the disease, and, second, no new large center of infection has been disclosed even in Massachusetts where, because of the lateness of the season, extensive cruising was first begun.

While negative evidence is notoriously unsatisfactory, especially in such matters as the presence of a fungus or insect pest, it seems probable that such extensive work as is now being carried on, mostly by experienced men under skilled direction, should shortly disclose any large centers of infection. To assume without intensive surveys continued over several years that the disease is not present in other States is merely to indulge in a false sense of security. (Neil E. Stevens).

THE FRUIT DISEASE SITUATION IN NORTHERN VIRGINIA FOR 1933

A. B. Groves

Financial difficulties must be accorded the rank of a major factor among the causes of the present outbreak of certain fruit diseases. Orchards have been widely neglected as to pruning, fertilizing, caring for weak trees, and spray practices. The virtual elimination of the extension of credit this season has left many growers with no alternative to that of neglect. Some orchards have, of course, been well sprayed and cared for, but more have not. Many are being cared for moderately well, and there are all degrees of neglect down to complete abandonment. It seems evident that much permanent damage will result. Drought-injured, mouse-girdled, cankered and otherwise weakened trees are being widely neglected and a great many of these are already dead, or are passing beyond recovery. It is evident that indirectly the effects of the present economic stress will be evidenced in the orchards of this section for many years to come.

Two developments of major interest are to be noted in the fruit disease situation in northern Virginia this (1933) season. The first of these is the very heavy apple scab infection which in addition to fruit infections, has been responsible for secondary injury to the foliage; the second development of major interest is the heavy leaf curl infection on peaches.

APPLE AND PEAR DISEASES. Apple Scab (Venturia inequalis). The outbreak of apple scab this season has been more severe than at any time during the past decade, and indeed fully as severe, if not more so, than the 1923-1924 outbreaks. It is probable that the total amount of injury will be decidedly greater because of the extensive defoliation, ranging from partial to complete, which has been so apparent for several weeks. This comes as an additional blow to trees which have been weakened as a result of the drought and neglect. This fact makes it difficult to estimate the injury caused by the disease.

The scab outbreak this year follows the serious one of last year, although the injury caused by the disease during 1932 was less severe generally. The general experience with the past season's outbreak resulted in better pre-blossom and immediate post-blossom spraying for scab this spring than had been the practice for years. Two pre-blossom sprays for all scab-susceptible varieties such as Delicious, Stayman, and McIntosh, and one for the more resistant Grimes and York, were recommended. This schedule was widely followed by the better orchardists, weather permitting. However, the unusually wet early season frequently made it impossible to apply the sprays properly and on time. The combined effect of the frequent rainfalls in stimulating the production of abundant tender foliage, and the very favorable scab-infection weather made an ordinarily acceptable job of spraying inadequate, and considerable infection resulted. Generally speaking, only those orchards which were well equipped and managed, and in sod culture or other crop which permitted operations in the orchards immediately or very soon after the cessation of rainfall, escaped considerable damage from scab. Fruit infection is generally severe, approximately one-third or more of the total crop being directly affected.

Aside from the injury to the fruit itself, both the trees and crop have been affected by the heavy foliage infection. Apples which might ordinarily reach salable size and be of some value despite their scab infection apparently will not "size up" in many of the severely affected orchards. In virtually every unsprayed, mediocre, or poorly sprayed orchard defoliation is now apparent, ranging in severity from moderate to over 90 per cent in some instances. Many of the remaining leaves are only partly functional due to injury by lighter infections. New leaves and shoots are being produced on many of these trees. The serious consequences of this defoliation upon the vigor of the trees, many of which are already weakened, and upon the crop they carry, is readily apparent.

Apple (Cedar) Rust (Gymnosporangium juniperi-virginianae). Cedar rust ceased to be of importance to the average orchardist in the important apple growing section of northern Virginia with the cutting of the cedar trees in the vicinity of orchards. However, there have been numerous smaller, and some large, outlying orchards which suffer even during an average season. The 1933 season has been more than usually favorable to the development of rust with the result that many of the orchards which are usually only moderately affected, are now severely diseased, and in some instances defoliation has resulted. In some orchards the fruit infection is fairly heavy, while in others it is less than might be expected from the heavy foliage infection. Quince rust (G. germinale) has been observed on fruits in several orchards, and is relatively abundant in a few.

Black-rot (Physalospora cydoniae). There is no unusual amount of fruit infection thus far this season. Infection has been observed following calyx arsenical injury on Ben Davis and some other apples. Limb and trunk cankers are relatively common on old and drought injured trees. The most striking development has been the heavy leaf spot infections. The weather early in the season was favorable for infection, and in many instances the infection of a conical area of leaves below small cankers was so severe as to appear as if "fired." Other leaves were slightly to heavily infected. This condition has been severe only in unpruned or poorly pruned orchards. Apple scab and in some instances cedar rust have caused such extensive foliage injury as to generally mask the effects of "frog-eye".

Powdery mildew (Podosphaera leucotricha) although not unusually prevalent occurs commonly on the Jonathan variety, especially the younger plantings. Many completely diseased shoots arising from twigs affected the previous year were to be observed early in the season.

Blotch (Phyllosticta solitaria). Apple blotch infections were first observed on June 10. The disease is not unusually abundant. Infections have been observed on Northwestern Greenings, which are very susceptible, and on Ben Davis, Stayman, and unidentified varieties.

Blight (Bacillus amylovorus) has caused considerable injury to both apples and pears the past two seasons, and has caused severe injury in some localities this year. The injury does not seem to be equal to last year, however, probably because blight did not occur until later than usual. The blighting of small and medium sized fruits was relatively more prevalent than usual. Blossom blight was very severe in some Grimes and York plantings,

however. In one instance, Grimes trees which were so severely blighted two years ago that virtually all fruit spurs were killed, were again blighted this season and the fruiting wood formed since that time was destroyed. No crop has been gathered from these trees for the past three years as a result of the disease.

Pears were often affected, but not as severely as in 1932.

Bitter rot (Glomerella cingulata) has been observed in one block of Mother apples. Little damage had been done, and it has not spread appreciably since the first observation. The trees have been well sprayed all season.

Measles and target canker (Undetermined). Measles-affected twigs from Delicious and Stark plantings have been brought in by several growers this year. The disease is to be found in almost all of these plantings, although the injury has not been severe except in a few instances. The papular type of measles has also been observed on several varieties.

Blister canker (Nummularia discreta) is prevalent in practically every old Ben Davis planting in this section. Many trees and limbs have been killed and many more are dying. Cankers have also been observed on several other varieties.

Root rot (Xylaria spp.). Xylaria root rot is to be found frequently on the roots of drought injured and old trees, often affecting replants several years old. Although occasionally observed, sporophores have not been abundant.

Water-core (Non-parasitic). A few cases of water-core have been observed on Duchess this season. The condition was very common in 1932. Storage did not benefit the condition as was the result with late-season varieties.

Spray injury (Chemical). The influence of the heavy apple scab infection as a factor contributing to spray injury is of interest. Numerous instances of severe foliage injury following post-blossom sprays of liquid lime-sulphur have been observed. Such injury was most severe on the scab susceptible varieties as Delicious and Stayman. Observation revealed almost all of the affected leaves to be so severely scabbed that the effect of the fungicide on the diseased regions had been to cause the dropping or death of the entire leaf. One Ben Davis planting was observed where almost the entire set of fruit was dropped together with the leaves. Like applications on the scab-resistant York and Duchess in the same orchard resulted in little injury. Most of the injury of this type was observed following the first cover spray. High temperatures at the time were no doubt a contributing factor.

Severe burning or scalding of the fruit as a result of the use of lime-sulphur during very hot weather has been observed, although such condition is not common.

Calyx-end injury and russetting have also resulted in many instances from the lime-sulphur lead-arsenate combination used early in

the season. The continued wet weather was a most important contributing factor in this type of injury. Calcium-arsenate injury occurred in some instances when the material was used alone, without Bordeaux mixture or an excess of lime.

STONE FRUIT DISEASES. Peach leaf curl (Exoascus deformans). The severe outbreak of leaf-curl on peaches constitutes a most noteworthy development in peach diseases this year. The outbreak was not unexpected as the disease has been noticeably building up for the past two seasons. This fact coupled with the occurrence of an early season favorable to infection and generally delayed or omitted dormant fungicidal spraying seemed to provide optimum conditions for an outbreak. Almost all unsprayed orchards were severely affected.

Brown rot (Sclerotinia fructicola) caused considerable damage in three unsprayed peach orchards which have been observed, but very little in well cared for orchards. Sweet cherries and home plantings of plums were severely affected, in many cases completely lost.

Yellows (Virus). Yellows-affected peach trees have been observed in five orchards this season. Affected trees had been observed in some of the orchards the previous season.

Bacteriosis (Bacterium pruni). No evidences of unusual injury attributable to this disease have been observed.

Scab (Cladosporium carpophilum) is common on peaches in home plantings and unsprayed orchards, but otherwise of little importance.

Spray injury (Chemical). The general acceptance of the zinc sulfate-lime combination as an arsenical corrective seems to have resulted in much less spray injury to peaches than was experienced when the combination was not used. Two instances of severe spray burn have been observed in orchards where these materials were not used.

Withering of cherries (Non-parasitic). A peculiar withering of Montmorency cherries was noted in one commercial planting, becoming so severe as to threaten the crop. The condition began to develop before the cherries reached maturity, the fruit first developing slight corky areas, later becoming hard and shrivelled. The trees appeared in good health and unaffected fruits developed normally. Although the condition was more prevalent on some branches than others, normal and affected fruits were often found close together or even intermixed.

BACTERIAL WILT OF CORN

PENNSYLVANIA: During the summer of 1933, bacterial wilt of sweet corn was very general; in fact, it was slightly more general than in 1932. The loss was slightly heavier in the western and central part of the State than in the eastern part. Earlier plantings were, in general, more heavily infected than later plantings.

There was a great deal of difference in susceptibility. Golden Early Market was the most severely affected, often running from 75 per cent to as high as 100 per cent infection, with all the plants killed before they were two feet high. Other susceptible varieties were the Burpee and Extra Early Bantam. Varieties not quite so severely infected were Spanish Gold and Whipple's Yellow. Golden Sunrise and Golden Cross Bantam were found to be very free of the disease; in fact, a check up of over 20 plantings of Golden Cross Bantam indicates that this variety had less than one per cent infection.

The loss from bacterial wilt was considerably lower in 1933 than in 1932, amounting in 1933 to about 30 per cent. In 1932 it was estimated at 45 per cent. I feel that this reduction in loss was due to the more general planting of resistant varieties, general clean up by the growers, and weather in 1933 that did not favor the disease quite as much as it did in 1932. (R. S. Kirby, Sept. 12).

OHIO: The first specimens of sweet corn showing Stewart's disease came to us June 19. We have not had as many inquiries this year as last. Possibly, our press bulletin service has furnished information to many who otherwise might have sent specimens.

The disease, of course, may be found in any part of the State. I estimate that the losses this year have been at least one-third less than last. There was an abundance of good sweet corn in Ohio this year.

Infections in field corn have been more noticeable this year than ever before. While the losses this year are relatively small, counts ranging from 2 to 8 per cent, it will be interesting to note if any increases occur next season. (R. C. Thomas, Sept. 11).

ILLINOIS: Due to unusual weather conditions, we have an unusual situation regarding the bacterial wilt of sweet corn. Considerable sweet corn was planted from April 22 to April 28. Most of this was necessarily of the earlier varieties such as the 60-day Wonders, the Golden Hummer, Golden Bantam, Sunshine, Spanish Gold, and similar kinds. One of my major projects was the introduction of the hybrid corn Golden Cross Bantam. All of these corns were severely attacked by bacterial wilt. At the University of Illinois, which is a fair example, Golden Sunshine was a 100 per cent loss. Whipple's Early Yellow, a variety that had previously shown some resistance, was about a 60 per cent loss. The hybrid corn Golden Cross Bantam was about a 20 per cent loss. Later, a combination of extreme drought, a very severe attack of corn root worms, and the most severe attack of chinch bugs ever known killed all of these corns; hence, I have no yield records to offer.

From April 28 to May 26 there was almost continuous rain, with extremely low temperatures. Many of the rains were of the driving, pounding type which left the soil in very bad condition. Hence, no corn planting was done during this period, which is normally the period of heaviest planting. From May 28 onward, a tremendous amount of corn was planted. The weather was extremely warm during this period. While most of this corn was of such varieties as Howling Mob, Country Gentleman, Whipple's Early Yellow, Bantam Evergreen, and other larger kinds, some of the early kinds were planted. None of these corns suffered severely from bacterial wilt. My records on yields are just beginning to come in now.

I have on my desk a report from the Cimco Farm, where I ran the Golden Cross Bantam and one of the Top Crossed Bantams against a commercial strain of Golden Bantam. These showed a combination of blighted seedlings and wilted plants of 5 per cent for the Golden Cross Bantam, 10 per cent for the Top Crossed Bantam, and 21 per cent for the commercial strain of Golden Bantam. Yield in pounds of green corn from 50 consecutive hills was: the Golden Cross Bantam, 61; Top Crossed Bantam, 51; and Golden Bantam, 37. Cimco Farm also reports that Golden Cross Bantam is only five days later than the Top Crossed Bantam and six days later than the commercial strain of Golden Bantam. The corn was served to the Kiwanis Club of the city of Havana, Illinois, and the members were asked to express their ideas as to relative quality. The consensus of opinion was that the three varities are equal in quality. (Lee A. Somers, Sept. 9).

NEW HAMPSHIRE:

August 27, a survey was made for the presence of bacterial wilt (Aplanobacter stewarti) in New Hampshire with the result that severely diseased, usually dying, sweet corn plants were found in gardens in the following towns and cities along routes U. S. 3 and 4: Nashua, Litchfield, Manchester, Pembroke, Concord, Salisbury, Andover, and Grafton. Samples from each of these localities were submitted to Dr. Charlotte Elliott, who confirmed the identification.

The diseased plants were all of the Golden Bantam or some other yellow variety. Some of the seed had been purchased from local dealers and was of unknown origin. In several cases, however, the seed was locally grown and one owner assured me that the particular strain showing the disease had been propagated in that town, Litchfield, New Hampshire, for at least five years. The incidence of the disease was never great. In only one garden noted did the number of dead plants exceed 1 per cent.

The most northern point visited is in the approximate latitude of Portland, Maine. Therefore, the most northerly infection yet known in New England is that in Oxford County, Maine, reported by Florence Markin in the Plant Disease Reporter, Volume XVII, Page 109.

Too often when increased abundance or extent of a disease is reported the question arises as to whether adequate search has previously been made and thus whether the change is not more apparent than real. In considering these reports of bacterial wilt of corn in the northern States during 1932 and 1933 it should be distinctly noted that these areas were carefully surveyed by competent investigators within recent years. Reference was made in the Plant Disease Reporter, Volume XVI, Page 150, to the fact that Clinton had failed through many years to find the disease in Connecticut prior to 1932. In their report on "Bacterial wilt of corn," published in May, 1933, Rand and Cash make the following statement regarding their work which covered the period 1918 to 1923:

> "For several years the present writers sought diligently for the disease in the Canadian border States of North Dakota, Minnesota, Wisconsin, Michigan, New York (northern portion), Vermont, New Hampshire, and Maine, but never found a single case, except a few affected Golden Bantam plants at Albany, N. Y., which marks the northernmost locality where they found this disease." (Page 4; U. S. Dept. Agr. Tech. Bul. 362. 1933).

The frequent reports during 1932 and 1933 thus apparently represent an real increase in the range of the disease. (Neil E. Stevens).

PLANT DISEASE SITUATION IN MONTANA

Extreme drought has prevailed over Montana this year so plant diseases are rare this year. Rusts of grains are rarely seen. There is a general opinion that stinking smut of wheat (Tilletia sp.) is less abundant than last year although it is very serious this year. In the plots on the Experiment Station here powdery mildew (Erysiphe graminis) has been abundant on winter and spring wheat. I found no stripe rust (Puccinia glumarum) of wheat this year, and red leaf rust (P. triticina) has only recently appeared. Serious spread of calico and witches broom diseases (both virus) occurred in potatoes last year. (P. A. Young, Aug. 15).

MOSAICS OF WHEAT

KANSAS: Field experiments were carried out near Salina in a field which was badly infested in 1932, but mosaic did not recur this season. Professor Melchers and Dr. Fellows received no reports of mosaic in wheat this season.

ILLINOIS (Mason County): Dr. Koehler and the writer inspected several areas this season. Mosaic-rosette was causing considerable damage in five fields of so-called Hardy Fultz wheat. From 10 to 50 per cent of the plants in these fields were diseased. Yellow mosaic was found in Kharkov, Turkey, and Duffy wheats. A large portion of 93 acres of Kharkov was badly stunted. Three fields of Turkey totaling about 45 acres showed mosaic in from about 10 to 30 per cent of the plants. (Logan County) Yellow mosaic was present in two fields of Purkof wheat. About 10 per cent of a field of 30 acres showed severe damage. (H. H. McKinney).

POTATO DISEASES IN MARYLAND

R. A. Jehle

There was a loss of approximately 25 per cent in the early potato crop on the Eastern Shore of Maryland. About 17 per cent of this loss was due to the drouth which occurred in that portion of the State in June. The other 8 per cent was due to the presence of diseases, Rhizoctonia (R. solani) accounting for 4 per cent, scab (Actinomyces scabies) for 3 per cent, and virus diseases for 1 per cent.

The most serious menace to the remainder of the potato crop is hopper burn. It is more destructive this year than at any time for the past twelve years and has already killed most of the unsprayed potato fields in the State. It has caused losses of from 10 to 75 per cent in medium early fields and the average loss in these fields will be about 25 per cent. Losses from virus diseases are rapidly decreasing due to the increase in the use of certified seed. On the Eastern Shore certified seed has been used ever since it could be obtained and there has been a steady decrease in losses from virus diseases. On the Western Shore home-grown uncertified seed is most extensively used and losses from virus diseases are much larger, often amounting to 25 and 50 per cent of the crop. During the past few years demonstrations with certified seed have been conducted on the

Western Shore. These have resulted in a very rapid increase in the use of certified seed with a correspondingly large decrease in the losses from virus diseases. Inspections for certification have just been completed in the Allegany Mountains. Losses from potato diseases in mountain counties have been greatly reduced during the past few years due to the increase in the use and production of certified seed and increase in the amount and thoroughness of spraying.

Fusarium wilt was found to be very destructive in the mountain counties. In some of the fields 25 per cent of the plants were found to have the wilt disease. The presence of wilt caused disqualification of more fields than any other condition. Late blight (Phytophthora infestans) was found to be just beginning to develop in a few of the fields and hopper burn was severe in all unsprayed fields. (Aug. 23).

ROOT ROT ON AMARANTHUS IN LOUISIANA

The pigweed, Amaranthus retroflexus, is a common weed pest in cane fields where the stands of cane are poor. It grows to be rather large, seven to eight feet high and one and a half to two and a half inches in diameter, where the soil is rich.

In a cane field near Reserve, St. John Parish, I noticed a group of several of these large weeds that appeared to be diseased. Three of them were completely dead and two others were wilting and turning yellow. These were in a roughly circular area, some fifteen feet in diameter. There were found to be attacked by Sclerotium rolfsii, the sclerotia being very numerous on the surface of the plants near the soil line. (E. C. Tims, July 2

FURTHER REPORTS ON EEL GRASS CONDITIONS

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As the destruction of eel grass (Zostera marina) continues to spread, its seriousness and importance becomes more apparent. The eel grass disappearance is having serious effects on many coastal industries, such as fishing, clamming, and hunting, as well as in the direct economic uses of the plant. Already complaints are coming in that since its disappearance a number of coastal areas are undergoing considerable alteration in topography.

On the other hand, reports from cooperators along the coast offer the encouraging news of a steady improvement in many places, particularly in the area south of New Jersey. In a few other areas an early report indicated improvement, but later a recurrence of the malady seemed to set in.

Since our reports of June 1 and August 15 in the Plant Disease Reporter, Volume 17, Pages 46-53 and 119-120, information has reached us from Canada that along the north shore of the Gulf of St. Lawrence the eel grass has died out to such an extent that less than 1 per cent of a normal stand now remains. Before the freeze last fall this area appeared to be

unaffected, but the eel grass was gone when the ice cleared away in spring. According to Dr. Harrison F. Lewis, Chief Federal Migratory Bird Officer of Ontario and Quebec, the destruction of the plant is now known to extend northward to the Strait of Belle Isle, which is near the northern limit of the plant's continuous range on the eastern coast of North America, although there are a number of isolated outlying northern stations which are as yet unaffected.

Dr. A. W. Hill, director of the Royal Botanic Gardens, Kew, states that he has received reports of the diminution of Zostera marina at the old Swannery, at Abbotsbury, at the head of the Fleet, on the Dorset Coast, and also in the neighborhood of Plymouth Sound. Dr. A. D. Cotton, in Nature of August 19, 1933, (p. 277), writes that in several localities in Devon signs of the disease appeared early in 1932 and that this summer many beds are entirely bare and the roots dead, only a few stray plants remaining. Eel grass in the Thames estuary and the vicinity of Yealm is also affected.

Dr. Einar Sönnberg reports under date of August 4 that the eel grass on the west coast of Sweden is destroyed. He says that when he arrived at the Kristinebergs Zoologiska Station in the middle of June, he noted an absence of the plant in places where it normally had formed green submarine meadows. Later a few green sprouts appeared. He remarks that the plants appeared to be normal in the summer of 1932, but in the middle of January, 1933, a botanist observed that all the plants except a few brown spotted leaves were gone. Dr. Sönnberg concluded, therefore, that the disease started late in the fall or early in the winter of 1932. He further comments that a colleague still finds the grass in apparently normal condition at Öresund Sound south of Kristinebergs.

Reports indicate that in Denmark the plant is dying off in the western parts of the Limfjord and probably also in other places. It is said to be largely killed out in most areas from Holland to Portugal; particularly is this true on most of the French coast, where the malady was first noticed in Europe.

Professor C. Louvageau and Doctors Roger Heim and Robert Lami of France write that the results of the malady are much less noticeable along the northern Mediterranean coast because the plant is normally much less abundant there and other closely related species, which are not affected, occur with it.

Doctors Heim and Lami (Comptes Rendus Acad. Agr. France, No. 20, June 14, 1933, pp. 738-742) write that part of the grass fields are destroyed in the area from Banyuls to Gruissans (on the Mediterranean), notably at Salces and Thau. On Berre Pond, the disappearance is nearly complete, and between Martigues and the Italian border a notable decrease is in evidence. At Corsica no decrease has been observed.

Zostera nana and other related species of aquatic plants do not appear to be affected.

The international interest in the disappearance of Zostera marina on both sides of the Atlantic Ocean has naturally stimulated observations of its condition in the Pacific. It is pleasant to be able to record that such experienced botanical observers as Lyman D. Phifer and Lois Clark of Washington State and Morten E. Peck of Oregon, report during September, 1933, that as yet no serious change in the abundance of eel grass has been noted. (Neil E. Stevens).